ment of this scorpion, of which very elaborate details are given, would appear not to agree closely with any other Arachnid type as yet described; the development of the central and lateral eyes entirely confirms the descriptions of Lankester and Bourne, as well as those of Parker, but Patten's conclusions are shown to be without foundation. The mode of formation of the ventral nervous system is exceptional among Invertebrates, resembling rather that of Chordata.—On the morphology of the compound eyes of Arthropods, by S. Watase (Plate xix.). Reprinted, with a short introduction by the editor, from a recent number of the "Studies from the Biological Laboratory, Johns Hopkins University."—On the structure of a species of earthworm belonging to the genus Diachæta, by Frank Beddard (Plate xx.). This new species, *D. windlei*, is from the Bermudas.—On *Hekaterobranchus shrubsoli*, a new genus and species of the family Spionidæ, by Florence Buchanan (Plates xxi. and xxii.). This worm was found at Sheppey in soft mud, usually covered by an inch or so of brackish water; in addition to the figures of the anatomical details there are coloured portraits of this Annelid.—An attempt to classify earthworms, by Dr. W. B. Benham. Some idea may be formed of the progress made within the last twenty years in our knowledge of this group when we state that the author enumerates and gives analyses of nine families of Lumbricomorpha, containing thirty-two genera and over 200 species. The author wishes the following correction made:—In Fig. 39, which illustrates the anatomy of Lumbricus, the œsophageal pouch (CP) is placed in somite xi.; followed by a pair of calciferous glands in the same somite and a second pair in somite xii. The pouch (CP) should be in somite x.

## *SOCIETIES AND ACADEMIES.*

### LONDON.

**Royal Society**, June 19.—"Contributions to the Molecular Theory of Induced Magnetism." By J. A. Ewing, F.R.S., Professor of Engineering in University College, Dundee.

After referring to the discussion by Maxwell of Weber's theory, which ascribes the magnetization of iron and other magnetic metals to the turning towards one direction of molecules which are already permanent magnets, and to suggestions by Profs. Wiedemann and Hughes, and lately by Mr. A. E. Kennelly (the *Electrician*, June 6 and 13, 1890), the writer describes experiments which he has made bearing directly on the molecular theory. The experiments have been made by grouping near to one another a large number of small pivotted magnets each free to turn about a fixed centre, and studying the configuration which the group assumes and the manner in which it yields when an external magnetic force is imposed. The results do not support the idea that the molecular magnets form closed chains in unmagnetized iron. They lead, however, to the important conclusion that no arbitrary conditions of directional constraint need be postulated to make the behaviour of the molecular magnets agree with what is known about magnetic quality.

In the writer's view the molecular magnets are perfectly free to turn in response to external magnetic forces, except in so far as they are constrained by the magnetic forces which they mutually exert on one another. This theory is briefly discussed in the paper in relation to the form of the magnetization curve, to the character of cyclical processes, and to the known effects of temperature, vibration, stress and so forth, and the following conclusions are stated:—

(1) That in considering the magnetization of iron and other magnetic metals to be caused by the turning of permanent molecular magnets, we may look simply to the magnetic forces which the molecular magnets exert on one another as the cause of their directional stability. There is no need to suppose the existence of any quasi-elastic directing force or of any quasi-frictional resistance to rotation.

(2) That the intermolecular magnetic forces are sufficient to account for all the general characteristics of the process of magnetization, including the variations of susceptibility which occur as the magnetizing force is increased.

(3) That the intermolecular magnetic forces are equally competent to account for the known facts of retentiveness and coercive force, and the characteristics of cyclic magnetic processes.

(4) That magnetic hysteresis and the dissipation of energy which hysteresis involves are due to molecular instability resulting from intermolecular magnetic actions, and are not due to anything in the nature of frictional resistance to the rotation of the molecular magnets.

(5) That this theory is wide enough to admit explanation of the differences in magnetic quality which are shown by different substances, or by the same substance in different states.

(6) That it accounts in a general way for the known effects of vibration, of temperature and of stress, upon magnetic quality.

(7) That, in particular, it accounts for the known fact that there is hysteresis in the relation of magnetism to stress.

(8) That it further explains why there is, in magnetic metals, hysteresis in physical quality generally with respect to stress, apart from the existence of magnetization.

(9) That, in consequence, any not very small cycle of stress occurring in a magnetic metal involves dissipation of energy.

**Anthropological Institute**, June 24.—E. W. Brabrook, Vice-President, in the chair.—Mr. J. E. Price exhibited parts of a skeleton found at West Thurrock, Essex.—Mr. H. H. Risley read a paper on the study of ethnology in India. This paper states the results of certain inquiries into the customs and measurements of the features, stature, &c., of some of the chief tribes and castes in India, conducted during the last five years under the authority of the Government of Bengal. Owing to the influence of the caste system, which forbids intermarriage between members of different castes, India offers a peculiarly favourable field for anthropological researches. The measurements disclose the existence of two extreme types—the Aryan and Dravidian. The Aryan type—as represented by the Brahmans, the Rajputs, and the Sikhs—is tall and fair, with a finely cut nose, and features on the whole superior to those of the average European. The Dravidians, as seen in the Kol tribes, who recently revolted against the oppression of their Hindu landlords, are short and very black, with a broad flat nose, closely approaching in its dimensions to that of the Negro. The proportions of the nose are regarded by European anthropologists—by Prof. Flower, F.R.S., of the British Museum, and Prof. Topinard, of Paris—as the best test of race distinctions. The Indian statistics bear out this opinion. They show that in Bengal caste is so closely connected with race that the social standing of a caste is in inverse ratio to the average width of the noses of its members. The lower the caste the broader and more Negro-like is its nose; and conversely, in ascending the social scale, we meet with continually finer noses, till in the higher castes European proportions are reached. The proportions of the head are of interest in connection with the theory propounded by Herr Karl Penka, of Vienna, and favoured by Prof. Sayce, that the Aryans were a dolichocephalic (long-headed) race who came originally from Scandinavia. The long-headed type is very numerous in the Punjab and North-West Provinces at the present day, and its distribution is such as to give considerable support to Herr Penka's opinions. The inquiry has also brought to light the existence in Bengal of totems such as are found among the North American Indians. Large tribes, like the Kols, are subdivided into two or three hundred groups, each of which is called after an animal, a tree, or a plant; and the rule is that a member of a particular animal group, such as the snakes, the tortoises, the eels, or the mangooses, may not marry within that group. Thus a snake man may not marry a snake woman, but must select his bride from among the frogs, the tortoises, the mango-trees, or a host of groups which include the whole fauna and flora of the district. The paper attempts to account for this custom, which the late Mr. J. F. McLennan called *exogamy*, by connecting it with the theory of natural selection. Among other interesting facts the Bengal inquiry shows that the practice of infant marriage, and the custom forbidding widows to marry a second time, are greatly on the increase, and are being adopted by the lower castes as marks of social distinction. It is feared that the spread of infant marriage will have a weakening effect on the race, and will multiply and aggravate those special diseases of women which Lady Dufferin's Fund was instituted to deal with. The increase in the number of widows is in itself a great evil. It lowers the position of women in India, and tends to lower the standard of social morality.

### PARIS.

**Academy of Sciences**, July 24.—M. Hermite in the chair.—M. Boussinesq presented the second and last volume of his "Course of Infinitesimal Analysis," and commented upon the

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application therein given of the integral calculus to physics and mechanics.—New researches on the relative stability of salts in the solid and dissolved state: aniline salts, by M. Berthelot. The author compares the heat of formation and the properties of the more stable aniline salts, such as the sulphate, nitrate, and chloride with the unstable ones, *e.g.* the acetate and benzoate. The observations furnish a new confirmation of thermo-chemical theories.—Heat of formation of certain amides, by MM. Berthelot and Fogh. The amides investigated are acetamide, propionamide, benzamide, and succinimide; and the experiments show that the heat of formation of anilides, *e.g.* acetanilide and benzanilide, is greater than that of the corresponding amides.—The share of the end-plates of motor nerves in the expenditure of the energy which produces contraction; influence exercised on the heating of a muscle by the number and nature of the changes of state which the end-plates excite in the contractile bundle, by M. A. Chauveau.—Discovery of a comet by M. Coggia at Marseilles Observatory. (See Our Astronomical Column.)—On the means of recognizing the *Cysticerci* (bladder worms) of *Tænia saginata*, which cause "measles" in the calf and ox, in spite of the rapid disappearance of the *Cysticerci* on exposure to the air, by M. A. Laboulbène.—On the sensibility of plants when regarded as ordinary reagents, by M. Georges Ville. The author has extended to peas and wheat his observations in 1867 on yeast as a test for phosphoric acid, and finds that their varying growth is an indication of extreme delicacy for very minute amounts.—On the production by electric discharges of images reproducing the principal characteristics of solar activity, by M. Ch. V. Zenger.—On the combination of observations, by M. R. Lipschitz. This is an extension of Gauss's application of the calculus of probabilities to errors of observation.—The diagrammometer: an additional apparatus for the study of curves, by Colonel Kozloff.—On the physical property of the surface of contact of two liquids under the influence of mutual affinity, by M. G. Van der Mensbrugghe.—On internal crystalline reflection, by M. Bernard Brunhes.—On the double elliptic refraction of quartz, by M. F. Beaulard.—On a magnetic anomaly observed in the neighbourhood of Paris, by M. Th. Moureaux. A discussion of the earliest results of a detailed magnetic survey of France now being made indicates that regions of local disturbance exist in the Paris basin.—Researches on the double phosphates of titanium, tin, and copper, by M. L. Ouvrard.—Researches on the optical dispersion of organic compounds: the ethers, by MM. Ph. Barbier and L. Roux.—Upon certain hydrates of the haloid esters, by M. Villard. The author finds that the iodide and fluoride of methyl form hydrates like the chloride and bromide. Experiments on the haloid compounds of ethyl show that the chloride and fluoride yield similar hydrates. The fluorides were gases prepared by M. Moissan's process, and yielded colourless crystalline hydrates.—On oxygluconic acid, by M. L. Boutroux. The author has obtained by the oxidation of either glucose or gluconic acid by bacterial action an acid, to which he gives the name oxygluconic, having the formula of glucoronic acid, $C_{12}H_{10}O_{14}$, but differing from the latter in being lævorotatory, very soluble in alcohol, and not yielding crystals on evaporation. The new acid appears to be identical with one recently obtained by M. Emile Fischer by the replacement of the acid radical of saccharic acid with an aldehyde group, using the action of sodium amalgam on its lactone.—On the examination of the impurities contained in alcohol, by M. Ed. Mohler.—On a new process for the determination of mineral matters in sugar by means of benzoic acid, by M. E. Boyer.—On the mineral springs of Cransac (Aveyron), by M. Ad. Carnot.—On the combinations of hæmoglobin with oxygen, by M. Christian Bohr.—Possibility of injections into the human trachea as a means of introducing medicines, by M. R. Botey.—Claim of priority in the discovery of craniectomy, by M. Guéniot.—On the mechanism of respiration in *Ampullaria*, by MM. Paul Fischer and E. L. Bouvier.—On the repair of the shell in *Anodon*, by M. Moynier de Villepoix. Numerous experiments on the growth in water with varying amounts of chalk in solution of the shell after artificial injuries indicate that it is a product of secretion of the mantle, that it is at first a purely organic formation, and that the lime for its consolidation is obtained from the surrounding medium.—On the secretion of silk in *Bombyx mori* (common silkworm), by M. Raphael Dubois. —The gangrene of the potato stem, a bacterial disease, by MM. Prillieux and G. Delacroix.—On the angle of polarization of igneous rocks and the chief lunar deductions therefrom, by M. J. J. Landerer. (See Our Astronomical Column.)

### BERLIN.

**Physiological Society**, June 18.—Prof. du Bois-Reymond, President, in the chair.—Dr. Blumenau gave an account of his researches on the development of the corpus callosum, carried out chiefly upon the brains of embryonic pigs, from which he concluded that the grey matter on the upper and lower sides of this structure grows by a fusion with the neighbouring bundles of arched fibres.—Prof. H. Virchow spoke on the gill-slits of the sturgeon, which he had examined with a view to finding a transitional form between the gills of Selachians and the osseous fishes. His anatomical and embryological investigations showed that with reference to its gills the sturgeon does not occupy that intermediate position which has been assigned to it by zoologists.—Prof. Gad described an experimental confirmation by Dr. Zagari of Donders's statement, denied by Knoll, that the inhaling of carbonic acid at the end of an expiration materially increases the depth of the ensuing inspiration. He had further found that this reflex effect is not observed after section of the vagi, and is not affected by section of the recurrent laryngeals. It did not take place when a glass tube was pushed down the trachea and one bronchus, so as to protect these portions of the air-passages from the action of the gas; but it reappeared on withdrawing the tube until its end rested at the bifurcation of the bronchi. From this it follows that the reflex inspiration is set up by the action of the gas on the mucous membrane of the bronchi. The effect was observed when the carbonic acid gas was diluted with 50 per cent. of air, but not upon further dilution. Marshall Hall's theory of respiration receives no confirmation from the above experiments. The concentrated $CO_2$ which makes its exit into the lungs themselves is probably inactive owing to its inevitable dilution by the residual air.

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